

## DETERMINING TROPHY HARVEST QUOTAS THROUGH A STATUS SURVEY OF URIAL (*OVIS ORIENTALIS*) IN THE KALABAGH GAME RESERVE, PUNJAB PROVINCE, PAKISTAN<sup>1</sup>

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In April 2001, a population survey of Urial (*Ovis orientalis*) was conducted in the Kalabagh Game Reserve, in northwest Pakistan, to determine its suitability for sustainable use management. During the survey, 259 Urial were observed (143 females, 20 lambs, 96 males). The 96 males were classified as 30, 19, 19, and 28; Class I, Class II, Class III, and Class IV rams, respectively. The number of lambs observed was low (7.7%) because the survey was conducted at or near the peak of lambing, when observing lambs is difficult. However, the high frequency of lambing activity we observed during the survey and proportion of Class I rams (male lambs of the previous year) indicates a productive population. An overall density of 13 Urial per sq. km was observed on the Reserve, but ranged from 7-23 per sq. km among sectors. Urial were abundant with good survival of lambs and yearling rams during recent years, and good survival of rams into older age classes. An initial conservative harvest quota of 5 Class IV rams could be established without negative consequences. Specific recommendations for sustainable use management are provided.

**Key words:** Urial, *Ovis orientalis*, sustainable use, population dynamics

### INTRODUCTION

The owners of the Kalabagh Game Reserve (KGR), in northwest Pakistan, were interested in the population status of Urial on their lands as of 2001. The goal was to have the government designate their privately-owned reserve a sanctioned community-based sustainable use hunting program. To accomplish this, it was necessary to conduct a population survey to determine suitability of the area. We summarize data resulting from the survey conducted during April 2001 and provide management recommendations.

### CONSERVATION STATUS

The taxonomic status of Urial is unclear and designation of various subspecies varies between authors (Clark 1964; Ellerman and Morrison-Scott 1966; Valdez 1982; Shackleton and Lovari 1997; Mitchell and Frisina 2007). In a synthesis of available information, Hess *et al.* (1997) considered the Urial at Kalabagh as the Punjab subspecies (*Ovis orientalis punjabiensis*). The Punjab subspecies is found as small, scattered populations throughout the Kala Chitta and Salt Range (Hess *et al.* 1997). The taxonomic status of Urial living along the west bank of the Indus River is uncertain (Schaller and Mirza 1974). All Urial are listed in Appendix II in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) except the Ladakh Urial (*Ovis orientalis vignei*), which is listed in Appendix I (USFWS 2001). The Punjab subspecies is listed as endangered in the IUCN Red List (IUCN 2000).

The Punjab Wildlife Protection, Preservation, Conservation and Management Act of 1974 protects Urial in Punjab Province from hunting, except under specific circumstances. Various wildlife protection laws enacted by the Pakistan National Government and Punjab Provincial Government are summarized by Hess *et al.* (1997). Urial at Kalabagh have been protected for the last 60 to 70 years by the Malik family who own the KGR and currently employ about 30 game guards.

### STUDY AREA

Established in the early 1930s, the KGR is located about 25 km southeast of the town of Kalabagh, Mianwali District, Punjab Province in a small massif that forms the most westerly extension of the Salt Mountain Range (32° 52' N, 71° 39' E). For many generations, this land has been the private property of the Nawab of Kalabagh. It was only in the 1930s, that the Urial were afforded special protection, and few were present at that time according to Nawab Malik Muhammad Asad (pers. comm. 2001). With shooting prohibited, except for limited trophy hunting by special permission, the Urial increased and in 1966 the population was estimated to be 500 (Mountfort 1969). Although declining in other portions of the Salt Range (Awan *et al.* 2004), the Urial population at Kalabagh has increased under protection, with the population estimated to be 700 in 1988 and 850 in 1992 (Hess *et al.* 1997).

Historically the Salt Range supported a spectrum of wildlife, including the Punjab subspecies (*Ovis orientalis punjabiensis*), Chinkara (*Gazella bennettii*), Chukor

(*Alectoris chukar*), See-See Partridge (*Ammoperdix griseogularis*), Grey Francolin (*Francolinus pondicerianus*) and Black Francolin (*Francolinus francolinus*) were plentiful due to the nature of the vegetation and topography. Important carnivores included Indian wolf (*Canis lupus pallipes*), Leopard (*Panthera pardus*), Jungle Cat (*Felis chaus*), Golden Jackal (*Canis aureus*), Red Fox (*Vulpes vulpes*), and Yellow-throated Marten (*Martes flavigula*). However, habitat destruction and uncontrolled hunting in the recent past have led to a marked reduction in the numbers and range of most species. Urial and Chinkara currently are the only large wild ungulates in the KGR. Wild Boar (*Sus scrofa*) is also present.

Livestock grazing within the KGR is limited to a few cattle and sheep that graze a short distance from the game guard headquarters at Jaba.

The Salt Range is an east-west trending thrust front about 175 km long and contains the second largest known mineral salt (sodium chloride) deposit in the world. The salt deposits are due to evaporation of the ancient Tethys Sea and formation of the Indus Plains from a collision of the Indian Plate with the Asian Plate resulting from continental drift 40 million years ago (King and Vincent 1993). Elevations in the Salt Range vary from 250 to 1,520 m. Sakesar Peak is the highest point at 1,524 m.

The dominant habitat type in the area is dry sub-tropical, semi-evergreen scrub forest (Roberts 1997). The important plant species are *Acacia modesta*, *Olea ferruginea*, *Salvadora oleoides*, *Zizyplus nummularia*, *Dodonaea viscosa*, *Prosopis glandulosa*, *Justicia adhatoda* and *Calotropis procera*. Shrubs are sparse, mostly scattered; *Zizyplus nummularia* and *Maytenus royleanus*, except in some ravines and on high ridges where *Dodonaea viscosa* is prominent. The predominant ground cover consists of grasses, importantly *Cymbopogon jwarancusa*, *Elusine compressa*, *Heteropogon contortus*, *Aristida adscensionis*, *Cynodon dactylon* and *Saccharum* sp.

Precipitation is in the form of rain. Data from the Meteorological Department weather stations at Mianwali, 30 km southwest of the KGR, provide an average annual rainfall of 454 mm for the 30-year period from 1961-1990. Rain is strongly seasonal with 60% falling during summer. Monsoon rains start around mid-July and last to mid-September. Winter rains begin in January and persist to early March. January is the coldest and June the warmest month of the year. Mean maximum daily temperature are usually >40° C in June.

## METHODS

All surveys were conducted from the ground while hiking. Urial were spotted from observation points and along

ridgeline travel routes. Drop-off points, base camp locations, and observation points were documented using GPS technology. Animals were observed with the aid of 8x and 10x binoculars. Relatively short sight distances made use of spotting scopes unnecessary. A group of 4 to 6 experienced observers went into the field together for 3 days (April 5-7, 2001) to observe sheep.

The habitat of the Urial at Kalabagh was divided into three sectors for survey purposes. Each sector was of a size and layout affording efficient coverage in one field day by the observation group. The area for each sector was estimated using field notes and GPS coordinates correlated to map coordinates on a 1:50,000 scale topographic map. The Dot Counting method was used to estimate the square kilometers for each sector. In this method, each dot represents a known area keyed to the scale of the base map employed.

Every effort was made to avoid counting an animal more than once. Each sector was surveyed only once, 1 sector per day, over a 3-day period. To minimize error, areas to be covered and distances to be traveled were carefully planned in advance. When the possibility existed that the same animals were observed more than once, only the first sighting was recorded.

Each Urial observed was classified into one of the following categories: adult ewe, lamb, or ram. Rams were further classified according to size, using horn length as an indicator of age, as follows: Class I (1-2 years old), Class II (3-4 years old), Class III (5-6 years old), and Class IV (>6 years old).

Location and altitude of sheep observation sites were recorded using a handheld GPS unit. Ram trophies previously harvested by hunters in the late 1960s and early 1970s and currently stored at Kalabagh were assigned an age by counting the number of annual growth rings using the method described by Geist (1966).

## RESULTS AND DISCUSSION

During the survey, 259 Urial were observed (143 females, 20 lambs, 96 males). The 96 males were classified as 30, 19, 19, and 28 – Class I, Class II, Class III, and Class IV respectively. During the survey, an average 86 Urial were observed per day in the field, indicating that Urial are abundant at Kalabagh. Urial were widely scattered throughout the area and many were observed as single animals or in groups of less than five.

### Population

In April 2001, an overall density of 13 Urial per sq. km was observed on the KGR, but the density varied with the survey sector, ranging from 7-23 Urial per sq. km. Comparing

data from an October 1970 survey with data from an April 1974 survey, Schaller (1977) reported Urial densities at Kalabagh of 11-13 per sq. km. However, Schaller's (1977) total census area was about 40 sq. km compared to our total census area, about 21 sq. km (Table 1). We only included habitat commonly used by Urial in our survey; lower elevation areas used primarily by Chinkara, but in which Urial are rarely observed, were not included.

The observed population structure at Kalabagh is summarized in Fig. 1. The largest proportion of rams in the population was Class I, indicating good survival of lambs and yearling rams during recent years. Mature Class IV or trophy-type rams were the second most abundant population segment, indicating good survival of males into older age classes. Class II and Class III rams each represented 19.8% of the male population segment, also indicating good survival.

In April, ewes are lambing at Kalabagh. During the survey, we found several newly born lambs and observed many ewes off by themselves apparently preparing for parturition. This is why the percentage of lambs (7.7%) observed is low. Lambs born the previous year were classified as either yearling (Class I) males or placed in the adult female category. Our observations indicate that this survey might have been conducted at or near the peak of lambing. The peak of lambing is a poor time to census the lamb population because newborn lambs are usually hidden from view.

More than half of all Urial observed were ewes (Fig. 1). The percentage of lambs observed would have been higher if the survey had been conducted after lambing was completed and the lambs had been old enough to travel with their mothers.

For the aforementioned reasons, data from this survey cannot be used to calculate an accurate lamb ratio for spring 2001. However, the high frequency of lambing activity we observed during the survey and proportion of Class I rams in the population indicates a productive population.

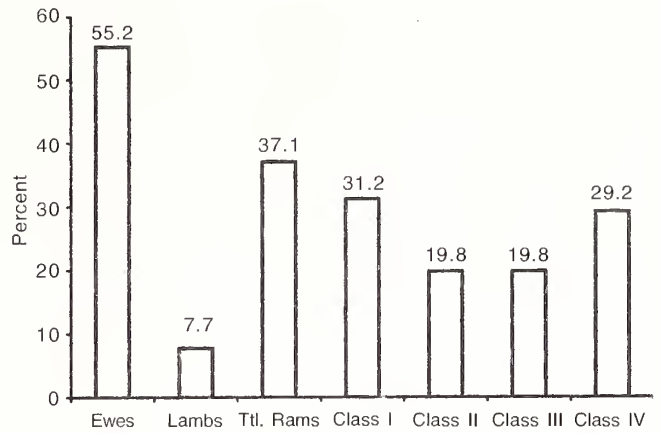


Fig. 1: Urial population sex and age structure as observed at Kalabagh, April 2001. Males by age class; I = 1-2 years old, II = 3-4 years old, III = 5-6 years old, IV = >6 years old

**Sustainable Harvesting**

Currently the Urial population at Kalabagh is not hunted. Prior to implementation of the Punjab Wildlife Protection, Preservation, Conservation and Management Act of 1974, the population was trophy hunted for many years on a limited basis (6-10 Class IV males per year) (Malik Muhammad Asad pers. comm. 2001). Eight Class IV males harvested at Kalabagh by trophy hunters (prior to the 1974 Act) were aged. The mean age was 9.6 years at death and ranged from 8-11 years at death. These data indicate that rams lived up to old age and were harvested near the end of their natural lifespan.

If the KGR is designated a Government sanctioned community-based sustainable use hunting area, it is essential an initial hunting quota be established. The only recent population data available for Kalabagh is that collected during our April 2001 survey. April is a poor time of the year to census Urial population as ewes are scattered due to lambing, recently born lambs are difficult to observe, and rams are scattered across their range. The result is probably a significantly lower number of total animals observed by sex and age class than

**Table 1:** Size of the Kalabagh Urial range, survey area, and number of Urial observed by sector and sex or age class

Sector	Sq. km	Urial observed	Adult Males (Class III & IV) <sup>1</sup>	Other Males	Females	Lambs
1	8.5	63	16	16	27	4
2	6.4	144	24	18	88	14
3 (portion surveyed)	4.5	52	7	15	28	2
3 (portion not surveyed)	2.0	-	-	-	-	-
Total area surveyed	19.4	259	47	49	143	20
Total Area of Urial range	21.4					

<sup>1</sup>Class III = 5-6 years old, Class IV = >6 years old

would be observed during a time of year when ewes and rams are more visible, such as during the October-November breeding season. Most counts of wild animals underestimate the true total because not all animals are seen during the census (Caughley and Goodard 1972). Thus, using data from this survey to estimate a suitable sustainable hunting quota provides a very conservative number of animals appropriate for harvest, but may be suitable where the purpose is to establish an initial safe quota.

Following examination of literature on similar species and populations, Harris (1993) concluded that an annual harvest of trophy males in numbers equivalent to 2 percent of the total population size can be maintained without negative consequences. Using the approach described by Harris (1993) and assuming the 259 Urial observed during this survey is the total population, an initial trophy hunting quota for fall 2001 could be up to 5 trophy males. Harvesting of males within a limit of 10-20% of the replacement of the trophy-sized segment is consistent with Wegge (1997) as a safe and conservative harvest level for stable or increasing wild sheep and goat populations. During this survey, we observed 19 Class III (5-6 year old) males, which is the population segment of replacement animals for harvested Class IV males.

A trophy harvest quota of 5 Class IV males is a conservative and appropriate harvest level for sustainable management, but should be considered a maximum number, until additional population monitoring is conducted during the fall breeding season when a population estimate can be developed for monitoring population trend. Because of the aforementioned observational biases, data collected during this April survey was not used to make a population estimate.

## CONCLUSIONS AND RECOMMENDATIONS

A sustainable use trophy harvest quota of five rams

from the Class IV age group could be established without negative impact to the population.

An intensive survey using the protocols developed for this survey should be conducted as soon as possible during the fall breeding season to establish a baseline for determining population trend for future trophy hunting quotas.

A detailed analysis of the Urial population's habitat at Kalabagh should be conducted to include a description of the diversity and extent of plant communities present, and the ecological condition of soils and vegetation; information essential for determining habitat carrying capacity for Urial.

All trophies harvested should be aged and standard physical measurements taken of carcasses and horns. Field necropsy for disease, parasites, and assessing animal health at time of death should be performed on all harvested trophies. Special training for the Game Guards may be required, but such data is essential for proper population management.

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## REFERENCES

- AWAN, G.A., T. AMAD & M. FESTA-BIANCHET (2004): Current status of Punjab Urial. *Islamabad Journal of Science* 14(1): 1-14.
- CAUGHLEY, G. & J. GOODARD (1972): Improving the estimates from inaccurate censuses. *Journal of Wildlife Management* 36(1): 135-140.
- CLARK, J.L. (1964): The great arc of the wild sheep. University of Oklahoma Press, Norman. 247 pp.
- ELLERMAN, J.R. & T.C.S. MORRISON-SCOTT (1966): Checklist of Palearctic and Indian Mammals 1758 to 1946. Alden Press, Oxford, Great Britain. 810 pp.
- GEIST, V. (1966): Validity of horn segment counts in aging bighorn sheep. *Journal of Wildlife Management* 30(3): 634-635.
- HARRIS, R.B. (1993): Wildlife conservation in Yenuiqou, Qinghai China: Executive summary. Ph.D. Dissertation. University of Montana, Missoula, Montana. 9 pp.
- HESS, R., K. BOLLMAN, G. RASOOL, A.A. CHAUDHRY, A.T. VIRK & A. AHMAD (1997): Indo-Himalayan Region, 8.5 Pakistan. Pp. 239-260. In: Shackleton, D.M. (editor). Wild sheep and goats and their relatives. IUCN/SSC Caprinae Specialist Group. Gland, Switzerland.
- IUCN (2000): 2000 IUCN Red List of Threatened Animals. International Union for Conservation of Nature and Natural Resources. Gland, Switzerland. 61 pp + CD.
- KING, J. & D. ST.VINCENT (1993): Pakistan – a Travel Survival Kit (4<sup>th</sup> ed.). Lonely Planet Publications. Hawthorn, Australia. 416 pp.
- MITCHELL, R.M. & M.R. FRISINA (2007): From the Himalayas to the Rockies. Retracing the great arc of wild sheep. Safari Press. Long Beach, California. 230 pp.
- MOUNTFORT, G (1969): The Vanishing Jungle. London: Collins, England.

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286 pp.

- ROBERTS, T.J. (1997): The Mammals of Pakistan. Revised edition, Oxford University Press. Oxford, New York, Karachi, Delhi. 525 pp.
- SHACKLETON, D.M. & S. LOVARI (1997): Classification adopted for the Caprinae survey: Chapter 3. Pp. 9-14. *In*: Shackleton, D.M. (editor). Wild sheep and goats and their relatives. IUCN/SSC Caprinae Specialist Group, Gland, Switzerland.
- SCHALLER, G.B. (1977): Mountain monarchs, wild sheep and goats of the Himalaya. The University of Chicago Press, Chicago and London. 425 pp.
- SCHALLER, G.B. & Z.B. MIRZA (1974): On the behaviour of Punjab urial (*Ovis orientalis punjabiensis*). Pp. 306-312. *In*: Geist, V. and F. Walther (editors). The behaviour of ungulates and its relation to management. IUCN Morges, Switzerland.
- VALDEZ, R. (1982): The Wild Sheep of the World. Wild Sheep and Goat International. Messilla, New Mexico. 186 pp.
- WEGGE, P. (1997): Appendix I. Preliminary guidelines for sustainable use of wild Caprins. Pp. 365-372. *In*: Shackleton, D.M. (editor). Wild sheep and goats and their relatives. IUCN/SSC Caprinae Specialist Group, Gland, Switzerland.
- USFWS (2001): Appendices I, II and III to Convention on International Trade in Endangered Species of Wild Fauna and Flora. US Dept. of the Interior, Fish and Wildlife Service, Division of Management Authority, Arlington, VA. 32 pp.

